SURGICAL TECHNIQUE – STEP BY STEP

Arthrodesis System 2.0 / 2.3, 2.5

APTUS® Hand / Wrist
Contents

3 Introduction
  3 Product Materials
  3 Indications
  3 Contraindications
  3 Color Coding
  3 Possible Combination of Plates and Screws
  3 Symbols
4 System Overview
6 Treatment Concept
8 Instrument Application
  8 General Instrument Application
  8 Sizing Templates
  9 Bending
 10 Reaming
 11 Drilling
 13 Assigning the Screw Length
 14 Screw Pick-Up
15 Surgical Techniques
  15 Specific Surgical Techniques
  15 2.0 / 2.3 TriLock STT Fusion Plate
  18 2.0 / 2.3 TriLock Four Corner Fusion Plates
  21 2.5 TriLock RSL Fusion Plates, Dorsal
  23 2.5 TriLock RSL Fusion Plates, Volar
  25 2.5 TriLock Wrist Fusion Plates
  28 2.5 TriLock Wrist Fusion Plates, Fusion of Radius and Capitate
  31 2.5 TriLock Total Wrist Fusion Plates, with Bend
  34 2.5 TriLock Total Wrist Fusion Plates, Straight
38 TriLock Locking Technology
  38 Correct Application of the TriLock Locking Technology
  39 Correct Locking (± 15°) of the TriLock Screws in the Plate
40 Appendix
  40 Implants and Instruments

For further information regarding the APTUS product line visit www.medartis.com
Introduction

Product Materials

APTUS implants, plates and screws, are made of pure titanium (ASTM F67, ISO 5832-2) or titanium alloy (ASTM F136, ISO 5832-3). All of the titanium materials used are biocompatible, corrosion-resistant and non-toxic in a biological environment. K-wires and staples are made of stainless steel (ASTM F138, ASTM F139); instruments are made of stainless steel, PEEK, aluminum or titanium.

Indications

APTUS Hand
- Arthrodeses in the hand

APTUS Wrist Arthrodesis
- The APTUS Wrist Arthrodesis Plates are indicated for wrist arthrodesis

Contraindications

- Pre-existing or suspected infection at or near the implantation site
- Known allergies and/or hypersensitivity to implant materials
- Inferior or insufficient bone quality to securely anchor the implant
- Patients who are incapacitated and/or uncooperative during the treatment phase
- Growth plates are not to be blocked with plates and screws

Color Coding

<table>
<thead>
<tr>
<th>System Size</th>
<th>Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTUS 2.0</td>
<td>Blue</td>
</tr>
<tr>
<td>APTUS 2.3</td>
<td>Brown</td>
</tr>
<tr>
<td>APTUS 2.5</td>
<td>Purple</td>
</tr>
</tbody>
</table>

Plates and Screws

Special implant plates and screws have their own color:

- Implant plates blue
- Implant screws gold
- Implant screws blue

Possible Combination of Plates and Screws

Plates and screws can be combined within one system size:

2.0/2.3 TriLock Arthrodesis Plates
- 2.0 Cortical Screws, HexaDrive 6
- 2.0 TriLock Screws, HexaDrive 6
- 2.3 Cortical Screws, HexaDrive 6

2.5 TriLock Arthrodesis Plates
- 2.5 Cortical Screws, HexaDrive 7
- 2.5 TriLock Screws, HexaDrive 7

Symbols

HexaDrive
- TriLock screw hole on sizing templates
## System Overview

The implant plates of the APTUS Hand/Wrist Arthrodesis System 2.0/2.3, 2.5 are available in the following designs:

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
<th>Main Feature</th>
<th>Plate Thickness</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0/2.3 TriLock STT Fusion Plate</td>
<td>A-4660.15</td>
<td>Locking</td>
<td>1.4 mm</td>
<td>2.0/2.3</td>
</tr>
<tr>
<td>2.0/2.3 TriLock Four Corner Plates</td>
<td>A-4660.10</td>
<td>Locking</td>
<td>1.4 mm</td>
<td>2.0/2.3</td>
</tr>
<tr>
<td>Small</td>
<td>A-4660.11</td>
<td>Locking</td>
<td>1.4 mm</td>
<td>2.0/2.3</td>
</tr>
<tr>
<td>2.5 TriLock RSL Fusion Plates Dorsal Left</td>
<td>A-4760.11</td>
<td>Locking</td>
<td>1.6 mm</td>
<td>2.5</td>
</tr>
<tr>
<td>Dorsal Right A-4760.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volar Left A-4760.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volar Right A-4760.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 TriLock Wrist Fusion Plates</td>
<td>Long Bend  A-4760.01</td>
<td>Locking</td>
<td>2.4 mm</td>
<td>2.5</td>
</tr>
<tr>
<td>Short Bend A-4760.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
<th>Main Feature</th>
<th>Plate Thickness</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 TriLock Wrist Fusion Plates, fusion of radius and capitate</td>
<td>Long Bend A-4760.07</td>
<td>Locking</td>
<td>1.8–2.6 mm</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Short Bend A-4760.08</td>
<td>Locking</td>
<td>1.8–2.6 mm</td>
<td>2.5</td>
</tr>
<tr>
<td>2.5 TriLock Total Wrist Fusion Plates</td>
<td>Straight A-4760.03</td>
<td>Locking</td>
<td>1.8–2.6 mm</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>A-4760.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long Bend A-4760.05</td>
<td>Locking</td>
<td>1.8–2.6 mm</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Short Bend A-4760.06</td>
<td>Locking</td>
<td>1.8–2.6 mm</td>
<td>2.5</td>
</tr>
</tbody>
</table>

www.medartis.com
# Treatment Concept

The table below lists typical clinical findings which can be treated with the implants of the APTUS Hand/Wrist Arthrodesis System 2.0/2.3, 2.5.

<table>
<thead>
<tr>
<th>Bones to fixate</th>
<th>Plates</th>
<th>Examples of typical clinical findings in which at the physician’s discretion an arthrodesis may be indicated.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaphoid</td>
<td>A-4660.15</td>
<td>• Osteoarthritis between scaphoid-trapezium-trapezoid&lt;br&gt;• Necrosis of the lunate bone&lt;br&gt;• Scapholunate ligament dissociation (SLAC)</td>
</tr>
<tr>
<td>Trapezium</td>
<td>A-4660.10</td>
<td>• Osteoarthritis between radius, scaphoid and potentially midcarpal joint</td>
</tr>
<tr>
<td>Trapezoid</td>
<td>A-4660.11*</td>
<td>• Degenerative and post-traumatic osteoarthritis in the radiocarpal joint</td>
</tr>
<tr>
<td>Capitate</td>
<td>A-4760.11</td>
<td>* For small wrists</td>
</tr>
<tr>
<td>Hamate</td>
<td>A-4760.12</td>
<td></td>
</tr>
<tr>
<td>Triquetrum</td>
<td>A-4760.13</td>
<td></td>
</tr>
<tr>
<td>Lunate</td>
<td>A-4760.14</td>
<td></td>
</tr>
</tbody>
</table>

* For small wrists
Bones to fixate

- Radius
- Scaphoid
- Lunate
- Capitate
- Trapezoid

- Radius
- Capitate
- Trapezoid

- Radius
- Scaphoid
- Lunate
- Capitate
- Metacarpal III

Plates

- A-4760.01
- A-4760.02**
- A-4760.07
- A-4760.08**
- A-4760.03
- A-4760.04
- A-4760.05
- A-4760.06**

Examples of typical clinical findings in which at the physician's discretion an arthrodesis may be indicated.

- Osteoarthritis in the radiocarpal and midcarpal joint; physiological movement in the carpometacarpal joint is maintained
- Osteoarthritis following proximal row carpectomy
- Osteoarthritis following failed partial arthrodesis (Four Corner Fusion)
- Post-traumatic deformity

- Osteoarthritis in the radiocarpal and midcarpal joint, including complete fusion of the carpometacarpal joint
- Post-traumatic deformity
- Rheumatic diseases
- Spastic deformity
- Tumor

** For small wrists and following proximal row carpectomy
General Instrument Application

Sizing Templates

Sizing templates facilitate the intraoperative selection of the appropriate implant.

Sizing templates for the Arthrodesis System 2.0/2.3, 2.5 are available according to the Appendix Implants and Instruments.

The sizing templates feature symbols that indicate the type of the screw hole and its position on the respective implant:

- for a TriLock screw hole (locking) using a TriLock or a cortical screw

The article number of the sizing template (e.g. A-4760.11TP) corresponds to the article number of the sterile implant (e.g. A-4760.11S). The suffix TP stands for template.

Use appropriate K-wires to temporarily fix the sizing template to the bone, if necessary.

Caution
Do not implant sizing templates.
Do not bend or cut sizing templates.
Bending

If required, the TriLock RSL Fusion plates (A-4760.13, A-4760.14) can be bent with the plate bending pliers (A-2047). The plate bending pliers have two different pins to protect the locking holes of flat and curved plates during the bending process.

The labeled side of the plate must always face upwards when inserting the plate into the bending pliers.

When bending a TriLock RSL Fusion plate (A-4760.13, A-4760.14), the plate bending pliers must be held so that the letters «F – FLAT PLATE THIS SIDE UP» are legible from above. This ensures that the plate holes are not damaged.

Notice

While bending, the plate must always be held at two adjacent holes to prevent contour deformation of the intermediate plate hole.
Caution
Do not bend the plate by more than 30°. Bending the plate further may deform the plate holes and may cause the plate to break postoperatively.

Caution
Repeatedly bending the plate in opposite directions may cause the plate to break postoperatively. Always use the provided plate bending pliers to avoid damaging the plate holes. Damaged plate holes prevent correct and secure seating of the screw in the plate and increase the risk of system failure.

Reaming
A specially designed reamer is available for each 2.0/2.3 arthrodesis plate to create a recess that matches the corresponding plate shape.

The reamers (A-3630, A-3631, A-3635) are positioned in the center of the bones to be fused. Apply perpendicular guidance and axial pressure to prepare the plate recess.

The top edge of the reamer serves as indication for the reaming depth.

Notice
If a power drill is used, low speed reaming for better control is recommended.
Drilling

Color-coded twist drills are available for every APTUS system size. All twist drills are color-coded via a ring system.

<table>
<thead>
<tr>
<th>System Size</th>
<th>Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTUS 2.0</td>
<td>Blue</td>
</tr>
<tr>
<td>APTUS 2.5</td>
<td>Purple</td>
</tr>
</tbody>
</table>

Core hole drills are characterized by one colored ring.

The twist drill must always be guided through the drill guide (A-2020, A-2722) or the self-holding drill sleeve (A-2726). This prevents damage to the screw hole and protects the surrounding tissue from direct contact with the drill. The drill guide also serves to limit the pivoting angle.

This symbol marks the end of the drill guide A-2020 used for centric drilling. This end is used for all 2.0/2.3 arthrodesis plates.
After positioning the plate, insert the drill guide or the self-holding drill sleeve and the twist drill into the screw hole. In the APTUS system, the drill is guided by the drill shaft and not the drill flute.

You can read the required screw length at the scale of the drill guide (A-2722) or the self-holding drill sleeve (A-2726) in connection with the black markings on the drill shaft of the twist drills (A-3713, A-3723 or A-3733).

The self-holding drill sleeve (A-2726) can be locked with a clockwise turn in the TriLock holes of the 2.5 plates (no more than ± 15°). It thus performs all of the functions of a drill guide without the need to be held.

**Caution**

For TriLock plates ensure that the plate holes are pre-drilled with a pivoting angle of no more than ± 15°. For this purpose, the drill guides show a limit stop of ± 15°. A pre-drilled pivoting angle of > 15° no longer allows the TriLock screws to correctly lock in the plate.
Assigning the Screw Length

The depth gauges (A-2032, A-2730) are used to assign the ideal screw length for use in monocortical or bicortical screw fixation of TriLock screws and cortical screws.

Retract the slider of the depth gauge. The depth gauge caliper has a hooked tip that is either inserted to the bottom of the hole or is used to catch the far cortex of the bone. When using the depth gauge, the caliper stays static, only the slider is adjusted.

To assign the screw length, place the distal end of the slider onto the implant plate.

The ideal screw length for the assigned drill hole can be read on the scale of the depth gauge.
Screw Pick-Up

The screwdrivers (A-2610, A-2710) and the screwdriver blade (A-2013) feature the patented HexaDrive self-holding system.

To remove the screws from the implant container, insert the appropriately color-coded screwdriver blade perpendicularly into the screw head of the desired screw and pick up the screw with axial pressure.

*Notice*
The screw will not hold without axial pressure!

Vertically extract the screw from the compartment.

*Notice*
Picking up the screw repeatedly may lead to permanent deformation of the self-retaining area of the HexaDrive inside the screw head. Therefore, the screw may no longer be able to be picked up correctly. In this case, a new screw has to be used.

Check the screw length and diameter at the scale of the measuring module. The screw length is determined at the end of the screw head.
2.0/2.3 TriLock STT Fusion Plate (A-4660.15)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

**Notice**
Special attention must be given to the joint surfaces between scaphoid and trapezium, scaphoid and trapezoid as well as between trapezium and trapezoid.

2. Stabilizing the carpal bones
Stabilize the carpal bones to be fused with K-wires (A-5040.21, A-5042.21).

**Notice**
Select the position of the K-wires in such a way as to avoid any collision with the reamer.

3. Preparing the plate recess
The reamer (A-3635) is positioned in the center of the bones to be fused. Apply perpendicular guidance and axial pressure to prepare the plate recess.
Notice
The top edge of the reamer serves as indication for the reaming depth. The plate is inserted directly beneath the dorsal bone surface.

4. Positioning the plate
Previously to the positioning of the plate (A-4660.15), the joints being fused are filled with cancellous bone.

Position the plate in such a way on the bones that at least two screw holes per carpal bone can be filled. If it is not possible to fix all three carpal bones with two screws each, the trapezoid, which is the most stable, may be fixed with only one blue TriLock screw (A-5450.xx).

5. Fixation of the plate
Drill a core hole through one of the screw holes using the APTUS twist drill (A-3410, A-3420, A-3430) for core diameter 1.6 mm (one blue ring) together with the drill guide (A-2020).
Assign the screw length using the depth gauge (A-2032) and insert a gold cortical screw Ø 2.0 mm (A-5400.xx). By means of the gold cortical screw, the bone is pulled to the plate.

Drill, assign the screw length and insert a gold cortical screw into each bone to be fused.

Remove the K-wires.

Drill, assign the screw length and insert blue TriLock screws Ø 2.0 mm (A-5450.xx) into the remaining screw holes of the plate. Insert at least one blue TriLock screw per bone. Through the use of the blue TriLock screws, the plate forms an angular stable construct with the bones.

**Notice**

Optionally, the gold cortical screws (A-5400.xx) inserted first may now be replaced with blue TriLock screws Ø 2.0 mm (A-5450.xx).

Use intraoperative X-ray control to verify the correct screw lengths.
2.0 / 2.3 TriLock Four Corner Fusion Plates (A-4660.10 / A-4660.11)

1. Preparing the joint surfaces
   Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

   **Notice**
   Special attention must be given to the joint surfaces between lunate and capitate, capitate and hamate, hamate and triquetrum as well as between triquetrum and lunate.

2. Reducing the carpal bones
   The scaphoid has to be removed partially or completely.

   Stabilize the carpal bones to be fused with K-wires (A-5040.21, A-5042.21). Special attention must be given to the anatomically correct position of the lunate.

   **Notice**
   Select the position of the K-wires in such a way as to avoid any collision with the reamer.

3. Preparing the plate recess
   The reamer (A-3630, A-3631) is positioned in the center of the bones to be fused. Apply perpendicular guidance and axial pressure to prepare the plate recess.
Notice
The top edge of the reamer serves as indication for the reaming depth. The plate is inserted directly beneath the dorsal bone surface.

Caution
If the plate is not placed beneath the dorsal bone surface, a risk of impingement between the plate and the dorsal radiolunar edge of the radius exists.

4. Positioning the plate
Previously to the positioning of the corresponding plate (A-4660.10, A-4660.11), the joints being fused are filled with cancellous bone.

Position the plate in such a way on the bones that at least two screw holes can be filled per carpal bone.

5. Fixation of the plate
Drill a core hole through one of the inner screw holes using the APTUS twist drill (A-3410, A-3420, A-3430) for core diameter 1.6 mm (one blue ring) together with the drill guide (A-2020).

Assign the screw length using the depth gauge (A-2032) and insert a gold cortical screw Ø 2.0 mm (A-5400.xx).
By means of the gold cortical screw, the bone is pulled to the plate.
Drill, assign the screw length and insert gold cortical screws into the remaining inner screw holes of the plate.

Remove the K-wires.

Drill, assign the screw length and insert blue TriLock screws $\phi$ 2.0 mm (A-5450.xx) into the outer screw holes of the plate. Insert at least one blue TriLock screw per bone. Through the use of the blue TriLock screws, the plate forms an angular stable construct with the bones.

Notice
Optionally, in case of the small 4CF (A-4660.11), the gold cortical screws (A-5400.xx) inserted first may now be replaced with blue TriLock screws $\phi$ 2.0 mm (A-5450.xx).

Use intraoperative X-ray control to verify the correct screw lengths and that no impingement exists.
2.5 TriLock RSL Fusion Plates, Dorsal (A-4760.11 / A-4760.12)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

Notice
Special attention must be given to the joint surfaces between radius and lunate, radius and scaphoid as well as between lunate and scaphoid. The distal pole of the scaphoid should be removed.

For optimal plate position, resect the Tuberculum listeri.

Previously to the positioning of the dorsal plate (A-4760.11, A-4760.12), the joints being fused are filled with cancellous bone.

2. Positioning and fixation of the plate
Position the plate on the bone. If necessary, the plate can be bent using the plate bending pliers (A-2047).

Drill a core hole through the oblong hole using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one colored ring) together with the drill guide (A-2722).

Assign the screw length using the depth gauge (A-2730) and insert a gold cortical screw Ø 2.5 mm (A-5700.xx).

Use intraoperative X-ray control to verify the correct plate position.
3. Fixation to the lunate and scaphoid
Drill, assign the screw length and insert blue TriLock screws Ø 2.5 mm (A-5750.xx) into lunate and scaphoid.

Notice
To additionally compress radius and carpal bones, loosen the gold cortical screw Ø 2.5 mm (A-5700.xx) in the oblong hole and perform compression. Thereafter, re-tighten the cortical screw.

4. Final fixation
Drill, assign the screw length and insert blue TriLock screws Ø 2.5 mm (A-5750.xx) into the remaining screw holes in the radius.
2.5 TriLock RSL Fusion Plates, Volar (A-4760.13 / A-4760.14)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the volar side.

Notice
Special attention must be given to the joint surfaces between radius and lunate, radius and scaphoid as well as between lunate and scaphoid. The distal pole of the scaphoid should be removed.

For optimal plate position, resect the distal edge of the radius on the volar side up to the radius shaft level.

Previously to the positioning of the volar plate (A-4760.13, A-4760.14), the joints being fused are filled with cancellous bone.

2. Positioning and fixation of the plate
Position the corresponding plate on the bone. If necessary, the plate can be bent using the plate bending pliers (A-2047).

Drill a core hole through the oblong hole using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring) together with the drill guide (A-2722).
Assign the screw length using the depth gauge (A-2730) and insert a gold cortical screw \( \Phi 2.5 \text{ mm} \) (A-5700.xx).

Use intraoperative X-ray control to verify the correct plate position.

3. Fixation to the lunate and scaphoid
Drill, assign the screw length and insert blue TriLock screws \( \Phi 2.5 \text{ mm} \) (A-5750.xx) into lunate and scaphoid.

Notice
To additionally compress radius and carpal bones, loosen the gold cortical screw \( \Phi 2.5 \text{ mm} \) (A-5700.xx) in the oblong hole and perform compression. Thereafter, re-tighten the cortical screw.

4. Final fixation
Drill, assign the screw length and insert blue TriLock screws \( \Phi 2.5 \text{ mm} \) (A-5750.xx) into the remaining screw holes in the radius.
2.5 TriLock Wrist Fusion Plates  
(A-4760.01 / A-4760.02)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

Notice
Special attention must be given to the joint surfaces between radius and lunate, radius and scaphoid, lunate and scaphoid, lunate and capitate, scaphoid and capitate, scaphoid and trapezoid as well as between capitate and trapezoid.

For optimal plate position, Lister's tubercle and, if necessary, the dorsal distal aspect of the radius surface are removed. Previously to the positioning of the plate (A-4760.01, A-4760.02), the joints being fused are filled with cancellous bone.

2. Positioning and temporary fixation of the plate
Place the hand in the angle to be fused and position the corresponding plate on the bone. For temporary plate fixation, K-wires (A-5040.41, A-5042.41) may be inserted.

Notice
To avoid impingement between plate and metacarpal, the plate must not project beyond the carpometacarpal joint.

3. Distal fixation of the plate
Drill a core hole, preferably into the trapezoid, using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring) together with the drill guide (A-2722) or the self-holding drill sleeve (A-2726).
Assign the screw length using the depth gauge (A-2730).
Start the fixation with inserting a gold cortical screw Ø 2.5 mm (A-5700.xx). By means of the gold cortical screw, the bone is pulled to the plate.

Drill, assign the screw length and insert a blue TriLock screw Ø 2.5 mm (A-5750.xx) into the capitate.

4. Fixation to the radius
Drill a core hole proximally through the oblong hole for the fixation to the radius. Assign the screw length and insert a gold cortical screw Ø 2.5 mm (A-5700.xx).

Remove the K-wires.

Notice
To additionally compress radius and carpal bones, loosen the gold cortical screw Ø 2.5 mm in the oblong hole and perform compression. Thereafter, re-tighten the cortical screw.

Use intraoperative X-ray control to verify the correct plate position.
5. Fixation to the carpal bones
For additional fixation of scaphoid and lunate, drill a core hole through the pre-angled screw holes using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring) together with the drill guide (A-2722). Assign the screw length and insert two gold cortical screws Ø 2.5 mm (A-5700.xx).

Caution
Do not insert blue TriLock screws Ø 2.5 mm (A-5750.xx) into the pre-angled screw holes.

6. Final fixation
Drill the remaining screw holes into the carpal bones and the radius. Assign the screw length and insert blue TriLock screws Ø 2.5 mm (A-5750.xx).

Caution
Into each carpal bone to be fused at least one blue TriLock screw Ø 2.5 mm (A-5750.xx) should be inserted; two blue TriLock screws Ø 2.5 mm would be optimal.
2.5 TriLock Wrist Fusion Plates, Fusion of Radius and Capitate (A-4760.07 / A-4760.08)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

Notice
Special attention must be given to the joint surfaces between radius and capitate.

For optimal plate position, Lister's tubercle and, if necessary, the dorsal distal aspect of the radius surface are removed. Previously to the positioning of the plate (A-4760.07, A-4760.08), the joints being fused are filled with cancellous bone.

2. Positioning and temporary fixation of the plate
Place the hand in the angle to be fused and position the corresponding plate on the bone. For temporary plate fixation, K-wires (A-5040.41, A-5042.41) are inserted distally into the capitate and proximally into the radius.

Notice
To avoid impingement between plate and metacarpal, the plate must not project beyond the third carpometacarpal joint.

Use intraoperative X-ray control to verify the correct plate position.

3. Fixation to the capitate
Drill a core hole through a distal screw hole into the capitate using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring) together with the drill guide (A-2722) or the self-holding drill sleeve (A-2726).
Assign the screw length using the depth gauge (A-2730) and insert a blue TriLock screw ∅ 2.5 mm (A-5750.xx).

**Notice**
If it is found to be necessary to pull the bone to the plate, use a gold cortical screw ∅ 2.5 mm (A-5700.xx) as a first screw.

Drill another screw hole into the capitate, assign the screw length and insert a blue TriLock screw ∅ 2.5 mm (A-5750.xx).

Remove the distal K-wire.

Drill the remaining screw holes into the capitate, assign the screw length and insert blue TriLock screws ∅ 2.5 mm (A-5750.xx).
4. Fixation to the radius and alignment
Drill a core hole proximally through the oblong hole for the fixation to the radius. Assign the screw length and insert a gold cortical screw Ø 2.5 mm (A-5700.xx).

Remove the proximal K-wire.

Notice
To additionally compress radius and carpal bones, loosen the gold cortical screw Ø 2.5 mm in the oblong hole and perform compression. Thereafter, re-tighten the cortical screw.

Use intraoperative X-ray control to verify the correct plate position.

5. Final fixation
Drill the remaining screw holes into the radius, assign the screw length and insert blue TriLock screws Ø 2.5 mm (A-5750.xx).
2.5 TriLock Total Wrist Fusion Plates, with Bend (A-4760.05 / A-4760.06)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

Notice
Special attention must be given to the joint surfaces between radius and lunate, radius and scaphoid, lunate and scaphoid, lunate and capitate, scaphoid and capitate as well as between capitate and metacarpal III.

For optimal plate position, Lister’s tubercle and, if necessary, the dorsal distal aspect of the radius surface are removed. Previously to the positioning of the plate (A-4760.05, A-4760.06), the joints being fused are filled with cancellous bone.

2. Positioning and temporary fixation of the plate
Place the hand in the position to be fused and position the corresponding plate on the bone. For temporary plate fixation, K-wires (A-5040.41, A-5042.41) may be inserted distally into the carpometacarpal joint and proximally into the radius.

Use intraoperative X-ray control to verify the correct plate position.

3. Fixation to the metacarpal III
Drill a core hole through a distal screw hole using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring) together with the drill guide (A-2722) or the self-holding drill sleeve (A-2726).
Assign the screw length using the depth gauge (A-2730). Start the fixation with inserting a blue TriLock screw Ø 2.5 mm (A-5750.xx).

**Notice**
If it is found to be necessary to pull the bone to the plate, use a gold cortical screw Ø 2.5 mm (A-5700.xx) as a first screw.

Drill a second core hole into the metacarpal. Assign the screw length and insert a blue TriLock screw Ø 2.5 mm (A-5750.xx).

Remove the distal K-wire.

4. **Fixation to the radius and alignment**
Drill a core hole proximally through the oblong hole for the fixation to the radius. Assign the screw length and insert a gold cortical screw Ø 2.5 mm (A-5700.xx).

Remove the proximal K-wires.

**Notice**
To additionally compress radius and carpal bones, loosen the gold cortical screw Ø 2.5 mm in the oblong hole and perform compression. Thereafter, re-tighten the cortical screw.

Use intraoperative X-ray control to verify the correct plate position.
Drill a core hole through a proximal screw hole. Assign the screw length and insert a blue TriLock screw $\varnothing$ 2.5 mm (A-5750.xx).

5. Fixation to the carpal bones
Drill a core hole through a screw hole into the capitate. Assign the screw length and insert a blue TriLock screw $\varnothing$ 2.5 mm (A-5750.xx).

Notice
If it is found to be necessary to pull the bone to the plate, use a gold cortical screw $\varnothing$ 2.5 mm (A-5700.xx) as a first screw.

Drill the remaining screw holes into the carpal bones. Assign the screw length and insert blue TriLock screws $\varnothing$ 2.5 mm (A-5750.xx).

6. Final fixation
Drill, assign the screw length and insert blue TriLock screws $\varnothing$ 2.5 mm (A-5750.xx) into the third metacarpal and the radius.
2.5 TriLock Total Wrist Fusion Plates, Straight (A-4760.03 / A-4760.04)

1. Preparing the joint surfaces
Expose and remove the cartilage surfaces and the hard subchondral zone between the bones to be fused from the dorsal side.

Notice
Special attention must be given to the joint surfaces between radius and lunate, radius and scaphoid, lunate and scaphoid, lunate and capitate, scaphoid and capitate as well as between capitate and metacarpal III.

For optimal plate position, Lister’s tubercle and, if necessary, the dorsal distal aspect of the radius surface are removed. Previously to the positioning of the plate (A-4760.03, A-4760.04), the joints being fused are filled with cancellous bone.

2. Positioning and temporary fixation of the plate
Place the hand in the position to be fused and position the corresponding plate on the bone. In order to achieve a correct plate position, insert K-wires (A-5040.41, A-5042.41) distally into the carpometacarpal joint and proximally into the radius.

Use intraoperative X-ray control to verify the correct plate position.

3. Fixation to the metacarpal III
Drill a core hole through a distal screw hole using the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring) together with the drill guide (A-2722) or the self-holding drill sleeve (A-2726).
Assign the screw length using the depth gauge (A-2730). Start the fixation with inserting a blue TriLock screw Ø 2.5 mm (A-5750.xx).

**Notice**
If it is found to be necessary to pull the bone to the plate, use a gold cortical screw Ø 2.5 mm (A-5700.xx) as a first screw.

Drill a second core hole into the metacarpal. Assign the screw length and insert a blue TriLock screw Ø 2.5 mm (A-5750.xx).

Remove the distal K-wire.

**4. Fixation to the radius and alignment**
Drill a core hole proximally through the oblong hole for the fixation to the radius. Assign the screw length and insert a gold cortical screw Ø 2.5 mm (A-5700.xx).

Remove the proximal K-wires.

**Notice**
To additionally compress radius and carpal bones, loosen the gold cortical screw Ø 2.5 mm in the oblong hole and perform compression. Thereafter, re-tighten the cortical screw.

Use intraoperative X-ray control to verify the correct plate position.
Drill a core hole through a proximal screw hole. Assign the screw length and insert a blue TriLock screw Ø 2.5 mm (A-5750.xx).

5. Fixation to the carpal bones
Drill a core hole through a screw hole into the capitate. Assign the screw length and insert a blue TriLock screw Ø 2.5 mm (A-5750.xx).

Drill, assign the screw length and fill the remaining screw holes in the carpal bones.

Notice
With the plate A-4760.03, only gold cortical screws Ø 2.5 mm (A-5700.xx) may be inserted into the pre-angled screw holes.

With the plate A-4760.04, blue TriLock screws Ø 2.5 mm (A-5750.xx) can be inserted.
6. Final fixation
Drill, assign the screw length and insert blue TriLock screws Ø 2.5 mm (A-5750.xx) into the third metacarpal and the radius.
Correct Application of the TriLock Locking Technology

The screw is inserted through the plate hole into a pre-drilled canal in the bone. An increase of the tightening torque will be felt as soon as the screw head gets in contact with the plate surface.

This indicates the start of the «Insertion Phase» as the screw head starts entering the locking zone of the plate (section «A» in the diagram). Afterwards, a drop of the tightening torque occurs (section «B» in the diagram). Finally the actual locking is initiated (section «C» in the diagram) as a friction connection is established between screw and plate when tightening firmly.

The torque applied during fastening of the screw is decisive for the quality of the locking as described in section «C» of the diagram.
Correct Locking (± 15°) of the TriLock Screws in the Plate

Visual inspection of the screw head projection provides an indicator of correct locking. Correct locking has occurred only when the screw head has locked flush with the plate surface (Fig. 1 and 3).

However, if there is still a noticeable protrusion (Fig. 2 and 4), the screw head has not completely entered the plate and reached the locking position. In this case, the screw has to be retightened to obtain full penetration and proper locking. In case of poor bone quality a slight axial pressure might be necessary to achieve proper locking.

*Do not overtighten the screw, otherwise the locking function cannot be guaranteed anymore.*
# Appendix

## Implants and Instruments

For detailed ordering information, please refer to the APTUS Ordering Catalog, also available at www.medartis.com.

## Plates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A-4660.10</td>
<td>A-5040.21</td>
<td>A-5400.17/1</td>
<td>A-5450.18/1</td>
<td>A-5700.20/1</td>
<td>A-5750.20/1</td>
</tr>
<tr>
<td>A-4660.10S</td>
<td>A-5040.21/2S</td>
<td>A-5400.17/1S</td>
<td>A-5450.18/1S</td>
<td>A-5700.20/1S</td>
<td>A-5750.20/1S</td>
</tr>
<tr>
<td>A-4660.11</td>
<td>A-5040.41</td>
<td>A-5400.18</td>
<td>A-5450.20</td>
<td>A-5700.22</td>
<td>A-5750.22</td>
</tr>
<tr>
<td>A-4660.11S</td>
<td>A-5040.41/2S</td>
<td>A-5400.18/1</td>
<td>A-5450.20/1</td>
<td>A-5700.22/1</td>
<td>A-5750.22/1</td>
</tr>
<tr>
<td>A-4660.15</td>
<td>A-5042.21</td>
<td>A-5400.18/1S</td>
<td>A-5450.20/1S</td>
<td>A-5700.22/1S</td>
<td>A-5750.22/1S</td>
</tr>
<tr>
<td>A-4760.01</td>
<td>A-5042.41</td>
<td>A-5400.19/1S</td>
<td>A-5500.08/1</td>
<td>A-5700.24/1</td>
<td>A-5750.24/1</td>
</tr>
<tr>
<td>A-4760.02</td>
<td>A-5400.06</td>
<td>A-5400.20</td>
<td>A-5500.10</td>
<td>A-5700.26</td>
<td>A-5750.26</td>
</tr>
<tr>
<td>A-4760.02S</td>
<td>A-5400.06/1</td>
<td>A-5400.20/1S</td>
<td>A-5500.10/1</td>
<td>A-5700.26/1</td>
<td>A-5750.26/1</td>
</tr>
<tr>
<td>A-4760.03</td>
<td>A-5400.06/1S</td>
<td>A-5400.20/1S</td>
<td>A-5500.10/1S</td>
<td>A-5700.26/1S</td>
<td>A-5750.26/1S</td>
</tr>
<tr>
<td>A-4760.03S</td>
<td>A-5400.07</td>
<td>A-5450.06</td>
<td>A-5500.12</td>
<td>A-5700.28</td>
<td>A-5750.28</td>
</tr>
<tr>
<td>A-4760.04</td>
<td>A-5400.07/1</td>
<td>A-5450.06/1</td>
<td>A-5500.12/1</td>
<td>A-5700.28/1</td>
<td>A-5750.28/1</td>
</tr>
<tr>
<td>A-4760.09</td>
<td>A-5400.07/1S</td>
<td>A-5450.06/1S</td>
<td>A-5500.12/1S</td>
<td>A-5700.28/1S</td>
<td>A-5750.28/1S</td>
</tr>
<tr>
<td>A-4760.05</td>
<td>A-5400.08</td>
<td>A-5450.07</td>
<td>A-5500.14</td>
<td>A-5700.30</td>
<td>A-5750.30</td>
</tr>
<tr>
<td>A-4760.06</td>
<td>A-5400.08/1</td>
<td>A-5450.07/1</td>
<td>A-5500.14/1</td>
<td>A-5700.30/1</td>
<td>A-5750.30/1</td>
</tr>
<tr>
<td>A-4760.06S</td>
<td>A-5400.08/1S</td>
<td>A-5450.07/1S</td>
<td>A-5500.14/1S</td>
<td>A-5700.30/1S</td>
<td>A-5750.30/1S</td>
</tr>
<tr>
<td>A-4760.07</td>
<td>A-5400.09</td>
<td>A-5450.08</td>
<td>A-5500.16</td>
<td>A-5700.32</td>
<td>A-5750.32</td>
</tr>
<tr>
<td>A-4760.07S</td>
<td>A-5400.09/1</td>
<td>A-5450.08/1</td>
<td>A-5500.16/1</td>
<td>A-5700.32/1</td>
<td>A-5750.32/1</td>
</tr>
<tr>
<td>A-4760.08</td>
<td>A-5400.09/1S</td>
<td>A-5450.08/1S</td>
<td>A-5500.16/1S</td>
<td>A-5700.32/1S</td>
<td>A-5750.32/1S</td>
</tr>
<tr>
<td>A-4760.08S</td>
<td>A-5400.10</td>
<td>A-5450.09</td>
<td>A-5700.08</td>
<td>A-5700.34</td>
<td>A-5750.34</td>
</tr>
<tr>
<td>A-4760.11</td>
<td>A-5400.10/1</td>
<td>A-5450.09/1</td>
<td>A-5700.08/1</td>
<td>A-5700.34/1</td>
<td>A-5750.34/1</td>
</tr>
<tr>
<td>A-4760.11S</td>
<td>A-5400.10/1S</td>
<td>A-5450.09/1S</td>
<td>A-5700.08/1S</td>
<td>A-5700.34/1S</td>
<td>A-5750.34/1S</td>
</tr>
<tr>
<td>A-4760.12</td>
<td>A-5400.11</td>
<td>A-5450.10</td>
<td>A-5700.10</td>
<td>A-5750.08</td>
<td>A-5750.08</td>
</tr>
<tr>
<td>A-4760.12S</td>
<td>A-5400.11/1</td>
<td>A-5450.10/1</td>
<td>A-5700.10/1</td>
<td>A-5750.08/1</td>
<td>A-5750.08/1S</td>
</tr>
<tr>
<td>A-4760.13</td>
<td>A-5400.11S</td>
<td>A-5450.10/1S</td>
<td>A-5700.10/1S</td>
<td>A-5750.08/1S</td>
<td>A-5750.08/1S</td>
</tr>
<tr>
<td>A-4760.13S</td>
<td>A-5400.12</td>
<td>A-5450.11</td>
<td>A-5700.11</td>
<td>A-5750.10</td>
<td>A-5750.10</td>
</tr>
<tr>
<td>A-4760.14</td>
<td>A-5400.12/1</td>
<td>A-5450.11/1</td>
<td>A-5700.11/1</td>
<td>A-5750.10</td>
<td>A-5750.10</td>
</tr>
<tr>
<td>A-4760.14S</td>
<td>A-5400.12/1S</td>
<td>A-5450.11/1S</td>
<td>A-5700.11/1S</td>
<td>A-5750.10</td>
<td>A-5750.10</td>
</tr>
<tr>
<td>A-4760.15S</td>
<td>A-5400.13/1</td>
<td>A-5450.12/1</td>
<td>A-5700.12/1</td>
<td>A-5750.12</td>
<td>A-5750.12</td>
</tr>
<tr>
<td>A-4760.16</td>
<td>A-5400.13/1S</td>
<td>A-5450.12/1S</td>
<td>A-5700.12/1S</td>
<td>A-5750.12</td>
<td>A-5750.12</td>
</tr>
<tr>
<td>A-4760.18</td>
<td>A-5400.14/1</td>
<td>A-5450.13/1</td>
<td>A-5700.13/1</td>
<td>A-5750.14/1</td>
<td>A-5750.14/1</td>
</tr>
<tr>
<td>A-4760.19</td>
<td>A-5400.14/1S</td>
<td>A-5450.13/1S</td>
<td>A-5700.14/1</td>
<td>A-5750.14/1S</td>
<td>A-5750.14/1S</td>
</tr>
<tr>
<td>A-4760.20</td>
<td>A-5400.15</td>
<td>A-5450.14</td>
<td>A-5700.15</td>
<td>A-5750.16</td>
<td>A-5750.16</td>
</tr>
<tr>
<td>A-4760.21</td>
<td>A-5400.15/1</td>
<td>A-5450.14/1</td>
<td>A-5700.16</td>
<td>A-5750.16</td>
<td>A-5750.16</td>
</tr>
<tr>
<td>A-4760.22</td>
<td>A-5400.15/1S</td>
<td>A-5450.14/1S</td>
<td>A-5700.16</td>
<td>A-5750.16</td>
<td>A-5750.16</td>
</tr>
<tr>
<td>A-4760.23</td>
<td>A-5400.16</td>
<td>A-5450.16</td>
<td>A-5700.18</td>
<td>A-5750.18</td>
<td>A-5750.18</td>
</tr>
<tr>
<td>A-4760.24</td>
<td>A-5400.16/1</td>
<td>A-5450.16/1</td>
<td>A-5700.18/1</td>
<td>A-5750.18</td>
<td>A-5750.18</td>
</tr>
<tr>
<td>A-4760.25</td>
<td>A-5400.16/1S</td>
<td>A-5450.16/1S</td>
<td>A-5700.18/1S</td>
<td>A-5750.18/1</td>
<td>A-5750.18/1S</td>
</tr>
<tr>
<td>A-4760.26</td>
<td>A-5400.17</td>
<td>A-4500.18</td>
<td>A-5700.20</td>
<td>A-5750.20</td>
<td>A-5750.20</td>
</tr>
</tbody>
</table>
## RCI Instruments

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A-3410</td>
<td>A-2013</td>
</tr>
<tr>
<td>A-3410S</td>
<td>A-2020</td>
</tr>
<tr>
<td>A-3420</td>
<td>A-2032</td>
</tr>
<tr>
<td>A-3420S</td>
<td>A-2032.1</td>
</tr>
<tr>
<td>A-3430</td>
<td>A-2047</td>
</tr>
<tr>
<td>A-3430S</td>
<td>A-2060</td>
</tr>
<tr>
<td>A-3630</td>
<td>A-2070</td>
</tr>
<tr>
<td>A-3630S</td>
<td>A-2073</td>
</tr>
<tr>
<td>A-3631</td>
<td>A-2610</td>
</tr>
<tr>
<td>A-3631S</td>
<td>A-2611</td>
</tr>
<tr>
<td>A-3635</td>
<td>A-2710</td>
</tr>
<tr>
<td>A-3635S</td>
<td>A-2722</td>
</tr>
<tr>
<td>A-3713</td>
<td>A-2726</td>
</tr>
<tr>
<td>A-3713S</td>
<td>A-2730</td>
</tr>
<tr>
<td>A-3723</td>
<td>A-2730.1</td>
</tr>
<tr>
<td>A-3723S</td>
<td>A-4660.10TP</td>
</tr>
<tr>
<td>A-3733</td>
<td>A-4660.11TP</td>
</tr>
<tr>
<td>A-3733S</td>
<td>A-4660.15TP</td>
</tr>
<tr>
<td>A-5045.41/1</td>
<td>A-4760.11TP</td>
</tr>
<tr>
<td>A-5045.41/2S</td>
<td>A-4760.12TP</td>
</tr>
<tr>
<td>A-5045.41/4</td>
<td>A-4760.13TP</td>
</tr>
<tr>
<td>S-3724</td>
<td>A-4760.14TP</td>
</tr>
<tr>
<td>S-3733</td>
<td>A-7006</td>
</tr>
<tr>
<td></td>
<td>A-7007</td>
</tr>
<tr>
<td></td>
<td>A-7009</td>
</tr>
<tr>
<td></td>
<td>A-7012</td>
</tr>
<tr>
<td></td>
<td>A-7013</td>
</tr>
</tbody>
</table>